Characteristic of surface myoelectric signals on maximum isometric voluntary contraction of wrist flexors and extensors in children with hemiplegic cerebral palsy

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Keywords: Cerebral palsy; Hand function; Children; Surface electromyography; Maximum isometric voluntary contraction

Introduction.– To study the characteristics of surface myoelectric signals on maximum isometric voluntary contraction (MIVC) of wrist flexors and extensors in an attempt to gain insight for improvement of hand function in children with hemiplegic cerebral palsy (HCP).

Material and method.– Sixty-eight children with HCP were assessed with surface EMG. Surface electrodes were applied on the skin of wrist flexors and extensors. Integrated EMG (iEMG), root mean square (RMS), co-contraction ratio (CR) during the MIVC were recorded and analysed.

Results.– In the MIVC of both hands, differences of RMS, iEMG and CR of wrist in children with HCP were statistically significant between the involved and non-involved hands ($P < 0.001$), as well as the iEMG of wrist between both hands had positively good correlation ($P < 0.05$). The RMS of wrist between the involved and non-involved hands had also positively good correlation ($P < 0.05$), when grasping maximally used by the involved hand.

Conclusions.– The involved hand of children with HCP has excessive co-activation of wrist flexors, poor muscle recruitment and isolated selective movement control ability. It may be very important to facilitate wrist extensors contraction, inhibit wrist flexors co-activation, to induce involved hand use for improvement of hand function in children with HCP.

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Use of baclofen pump in the cerebral palsy of child: National survey of practice

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Keywords: Physical medicine and rehabilitation; Cerebral palsy; Children; Spasticity; Intrathecal baclofen

Objective.– The aim of this study was to shed a light on the current use of intrathecal baclofen delivered by pump infusion in France for cerebral palsy in children in order to standardize practice in that specific indication.

Method.– We performed an observational study based on a standardized questionnaire sent to 29 pediatric PM&R services over the country. The questionnaire consisted in closed responses (yes or no).

Results.– Twenty-four services responded to the questionnaire. Pre-test evaluation was performed in 22 cases and post-test evaluation in 21 cases, and early after implantation in 20 cases and late after implantation in 17 cases. Single shot infusion was the test favored by PM&R physicians in 15 cases. The pump was implanted in the subcutaneous tissue in 19 cases. Early complications were observed in 16 cases after pump implantation. Late complications were observed in 2 cases and consisted in catheter migration.

Discussion.– In conclusion, the current study demonstrated large practice diversity over the country and highlighted to potential for complications due to the treatment. The follow-up of the treated patients was also non-uniform. It should be of interest to develop nationwide standardized strategies in order to improve and make uniform patient management.

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Effect of motor imagery in children with unilateral cerebral palsy: fMRI study

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Keywords: Motor imagery; Cerebral palsy; Rehabilitation; fMRI

Motor imagery (MI) is considered as a promising therapeutic tool for rehabilitation of motor planning problems in patients with cerebral palsy. However, motor planning problems may lead to poor MI ability. The aim of this functional magnetic resonance imaging study was to examine and compare brain activation following MI tasks in patients with hemiplegic cerebral palsy with left or right early brain lesions and the influence of the side of imagined hand movement.

Twenty patients with clinical hemiplegic cerebral palsy participated in this study. Using block design, brain activations following MI of a simple opening-closing hand movement performed by either the paretic or nonparetic hand was examined.

During MI tasks, patients with early right brain damages activated bilateral fronto-parietal network that comprises most of the nodes of the network well described in healthy subjects. Inversely, in patients with left early brain lesion, brain activation following MI tasks was reduced, compared to patients with right brain lesions. We found also a weak influence of the side of imagined hand movement.

This study gives neuronal substrate to propose MI tasks in unilateral cerebral palsy rehabilitation at least for patients with right brain lesions.

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The perception-action coupling. Influencing factors in young cerebral palsied population. A comparative study about 14 cases

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Keywords: Cerebral palsy; Perception; Action; Sensorimotor function; Dyspraxia

Objective.– To assess the perception-action coupling in the young cerebral palsied population and determine the influence of each sensorimotor and cognitive mechanism.

Population and method.– Two groups of 14 young, aged between 14 and 17: a CP and a control group. They all had a clinical assessment (hands and neurovisual functions, WISC and NEPSY) as well as three calibrated tests: direct anticipation of a moving target to assess sensorimotor loop. Indirect anticipation and Arrival judgment after passage through a tunnel of a moving target to assess both cognitive loop. Statistic study with Analysis of variance (ANOVA), Constant Error (CE) and Standard Deviation (SD) and Newman-Keuls Tests.

Results.– For sensorimotor loop, there is a significant correlation for all variables ($P < 0.05$). The ST increases in "PC" (90 to 60 ms) and is stable in control group (35 ms). For the cognitive loop: there is a significant difference between two groups followed by progressive normalization.

Discussion.– This work confirms an overall alteration of perception-action coupling in studied CP population. Alteration persists in the sensorimotor coupling and improves in predictive tasks.

The "learning" effect is significant for younger approving the benefits of early rehabilitation.

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Quality of survival after childhood medulloblastoma

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Keywords: Childhood medulloblastoma; Neuropsychological deficits; Endocrine deficits; Cerebellar syndrome; Quality of life; Intervention

Background.– Medulloblastoma is the most common childhood central nervous system tumour. Treatment includes surgical resection, cranio-spinal irradiation and adjuvant chemotherapy. Although survival has improved dramatically, the tumour and its treatments have devastating long-term side effects, negatively impacting quality of survival (QoS).

Objective.– To review the literature on QoS after childhood medulloblastoma.

Method.– Medline database search with the following keywords: brain tumour, child, medulloblastoma, PNET, quality of life, quality of survival, long-term outcome, neuropsychological, endocrine, intervention.

Results and discussion.– Frequent problems include medical complications, such as long-term cardio-vascular, endocrine and growth morbidity, second tumors, hearing loss and neurological deficits. Neurocognitive impairment is extremely frequent, resulting from the negative effect of radiation on white matter development, with children displaying diminished ability to acquire new information. All cognitive domains are affected. Negative prognostic factors include young age at diagnosis, presence of post-operative cerebellar mutism, cranial radiation dose and volume. High rates of academic failure and special education needs are reported. Those deficits persist in adulthood, with poor social and community integration, and high rates of unemployment. Long-term follow-up is required until transition to adult services, in order to monitor development, implement timely adequate multi-disciplinary rehabilitation interventions and special education or support when necessary.

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Outcome six years after shaken baby syndrome

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Objectives.– Assess long-term outcome several years after a shaken baby syndrome (SBS).

Patients and methods.– All patients admitted following a SBS at the pediatric neurosurgery unit of Necker Enfants Malades Hospital in 2006 and 2007 were included. In 2012, patients were offered to participate in this study, consisting of a standard medical examination, short cognitive tests and standardized questionnaires.

Results.– Eighteen (33%), out of 54 patients, participated after a mean length of follow-up of 6.2 years (SD = 7.3; 64–88 months). Children suffered motor deficits (22%), epilepsy (22%), visual deficits (33%), language abnormalities (39%), graphic difficulties (44%), attention deficits (33%) and behavioural disorders (44%). Sixty-one percent of the children still needed rehabilitation and 28% had special educational needs. The mean developmental quotient was significantly reduced [85 (SD 22.4; range 29–108)] ($P = 0.01$). Eleven children (60%) had returned to a normal life (GOS-E Peds levels 1 and 2). Mean T-score for the Global Executive Composite on the Behavior Rating Inventory of Executive Function was 52.3 (SD = 10, range: 34–74), with 3 children scoring in the clinical range (18%).

Conclusions.– Our results emphasize the need for an extended follow-up of medical and academic outcomes following SBS because of the severe and long-lasting sequelae.

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Role of physical and rehabilitation medicine physician regarding of children and adolescents with acquired brain injury

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Keywords: Brain injury; Child; Disability evaluation; Physical therapy modalities; Occupational therapy; Speech therapy; Rehabilitation

Acquired brain injury (ABI) is one of the most important causes of mortality and severe disability among children. Children with ABI can suffer from a wide number of disorders that increase their disability in various fields of functioning, impacting on their integration and full participation within their family, school and society.

During the acute, post-acute and long-term settings, the role of the Physical Medicine and Rehabilitation (PRM) specialist has been identified. The different settings where a PRM-specialist has to work among these patients in all phases of the recovery process are described here, during the hospital stay, while preparing for discharge, as well as in the long-term follow-up after discharge. Although their presence is important in all three settings, PRM expertise is particularly important during the post-acute and long-term follow-up. An interdisciplinary team of different professionals is also necessary in order to obtain the best results and PRM specialists are well placed to lead with it.

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A model of awareness deficit in children with brain injury to better adapt cognitive rehabilitation interventions

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Keywords: Model; Awareness; Children; Autobiographical memory; Metacognition; Error detection

Background.– Weak awareness of cognitive impairment and weak metacognition is a common phenomenon described in children who sustained brain injury (BI). However, it results from a combination of organic anosognosia and simple developmental immaturity, present in typically developing children as well. Currently used models in adults are therefore not appropriate for children.

Aim.– To develop a model of awareness in children for rehabilitation clinical and research purposes.